

What is claimed is:

1. A method of configuring a wireless RF network, the network comprising a plurality of network nodes for communicating with other nodes, each node of the wireless RF network having a controller unit, a data store and a unique identifier, the method comprising the steps of:

a) selecting at least one of the plurality of nodes to serve as a control node of the wireless RF network;

b) providing the at least one selected control node with a unique host ID stored in a host ID register accessible to said selected control node;

c) periodically detecting other nodes within the coverage area of each respective node of the plurality of nodes by sending an inquiry message;

d) periodically updating the data store of each respective node of the plurality of nodes with addresses of detected nodes received from responses to the inquiry message by said detected nodes;

e) storing the unique identifier of each respective node prescribed to pertain to the wireless RF network accessible to the at least one control node of the wireless RF network;

f) transmitting from the at least one control node of the wireless RF network a dynamic paging message addressed to each respective node located within the coverage area of the at least one control node according to step (d) and having the unique identifier stored accessible to the at least one control node according to step (e);

g) updating the data store of each respective node receiving the dynamic paging message and returning relative information of the updated data store to the at least one control node of the wireless RF network from each respective node receiving the dynamic paging message;

h) storing the received relative information of the updated data store accessible to the at least one control node of the wireless RF network;

i) transmitting from the at least one control node of the wireless RF network a message to each respective node which returned the relative information of the updated data store, the message instructing said node to send the dynamic paging message addressed to each respective node matching predefined criteria;

j) repeating steps (g) to (i) until every node identified to the at least one control node according to step (e) has been paged.

2. The method of claim 1, wherein the predefined criteria are matched if the respective node to be paged is located within the coverage area of the node instructed to send the dynamic paging message and has a unique identifier stored accessible to the at least one control node, and if the respective node to be paged has not previously been paged.

3. The method of claim 1, wherein the dynamic paging message comprises the unique host ID of the at least one control node of the wireless RF network and a dynamic hops-to-host count.

4. The method of claim 3, wherein the dynamic hops-to-host count is dependent on the placement of each respective node receiving the dynamic paging message.

5. The method of claim 4, wherein the hops-to-host count is 1 when the node receiving the dynamic paging message is within the coverage area of the at least one control node of the wireless RF network, and the hops-to-host count is incremented by 1 each time a previously paged node is instructed to send the dynamic paging message to each respective node matching predefined criteria.

6. The method of claim 3, wherein the unique host ID is stored in a non-volatile host ID register of each respective node receiving the dynamic paging message.

7. The method of claim 1, wherein the wireless network is a short range RF network.

8. The method of claim 7, wherein the wireless network is a Bluetooth network.

9. The method of claim 1, wherein:

if a node comprises at least two transceivers, the first transceiver to answer the dynamic paging message is designated as a slave transceiver of the RF network and least one of the other transceivers is designated as a master transceiver of the RF network, and each transceiver designated as a master does not answer the dynamic paging message.

10. The method of claim 9, wherein in step (c) detecting of other nodes is performed by the master.

11. The method of claim 1, wherein a node further includes a transceiver for communication with wireless terminals, whereby a wireless terminal in transmission range of a node may communicate with another wireless terminal in transmission range of a node.

12. The method of claim 1, wherein the control node further comprises a gateway to another network, whereby a wireless terminal in transmission range of a node may communicate with a terminal on said other network.

13. The method of claim 1, wherein a node not within a transmission range of a certain node communicates with the certain node by relaying through other of the nodes of the wireless RF network.

14. A method of configuring a wireless RF network, the network comprising a plurality of network nodes for communicating with other nodes, each node of the wireless RF network having a controller unit, a data store and a unique identifier, the method comprising the steps of:

- a) maintaining identification information including a unique identifier of each respective node of the plurality of nodes prescribed to pertain to the wireless RF network;
- b) periodically detecting other nodes within coverage area of each respective node of the plurality of nodes and updating the data store of the each respective node of the plurality of nodes with information received from the detected nodes;
- c) transmitting a dynamic paging message addressed to each respective node matching predefined criteria;
- d) storing relative information of the dynamic paging message within each respective node receiving the dynamic paging message and returning a response message to the dynamic paging message;
- e) repeating steps c) and d) until every node identified according to step a) has been paged.

15. The method of claim 14, wherein the predefined criteria are matched if the respective node to be paged is located within the coverage area of the transmitting node and having unique identifier stored accessible to the at least one node of the wireless RF network, and if the respective node to be paged has not previously been paged.

16. The method of claim 14, wherein the dynamic paging message comprises the unique host ID of the at least one control node of the wireless RF network and a dynamic hops-to-host count.

17. The method of claim 16, wherein the dynamic hops-to-host count is dependent on the placement of each respective node receiving the dynamic paging message.

18. The method of claim 17, wherein the hops-to-host count is 1 when the node receiving the dynamic paging message is within the coverage area of the at least one control node of the wireless RF network, and the hops-to-host count is incremented by 1 each time a previously paged node is instructed to send the dynamic paging message to each respective node matching predefined criteria.

19. The method of claim 16, wherein the unique host ID is stored in a non-volatile host ID register of each respective node receiving the paging message.

20. The method of claim 14, wherein the wireless network is a short range RF network.

21. The method of claim 20, wherein the wireless network is a Bluetooth network.

22. The method of claim 14, wherein:

if a node comprises at least two transceivers, the first transceiver to answer the dynamic paging message is designated as a slave transceiver of the RF network and least one of the other transceivers is designated as a master transceiver of the RF network, and each transceiver designated as a master does not answer the dynamic paging message.

23. The method of claim 22, wherein in step (b) detecting of other nodes is performed by the master.

24. The method of claim 14, wherein a node further includes a transceiver for communication with wireless terminals, whereby a wireless terminal in transmission range of a node may communicate with another wireless terminal in transmission range of a node.

25. The method of claim 14, wherein the control node further comprises a gateway to another network, whereby a wireless terminal in transmission range of a node may communicate with a terminal on said other network.

26. The method of claim 14, wherein a node not within a transmission range of a certain node communicates with the certain node by relaying through other of the nodes of the wireless RF network.

27. A method of routing information while maintaining configuration of a wireless RF network, the network comprising a plurality of network nodes for communicating with other nodes, each respective node having a controller unit, a data store and a unique identifier, the method comprising the steps of:

a) periodically sending a current data load information and a hops-to-host count from each respective node of the wireless RF network to other nodes within the coverage area of said respective node of the wireless RF network;

b) periodically updating the data store of the each respective node of the wireless RF network with the data load information and the hops-to-host count of other nodes within the coverage area of said respective node of the wireless RF network;

c) selecting at least one path having least hops-to-host count for routing messages from a node to at least one control node of the wireless RF network; and

d) if more than one path having least hops-to-host count exists, selecting from among them a path with least load for routing messages from the node to the at least one control node of the wireless RF network.



28. The method of claim 27, wherein each node removes from its data store information pertaining to a node that does not report current load for a predetermined time, whereby a node that becomes non-functional is removed from the network configuration.

29. The method of claim 27, further comprising the steps of:

sending a service discovery message from a transceiver of a certain node that has just been powered on, the message including the transceiver's unique address;

receiving the service discovery message in a client interface transceiver of a network node and sending a message from the network node to the identified transceiver of the certain node, the message containing a handle of a network service accessible through the network node;

registering the certain node in the data store of the network node, the registration including a hops-to-host count one greater than the network node's;

sending a message to the certain node containing a number one greater than the network node's hops-to-host count, which number is recorded in the certain node as its hops-to-gateway count, and load information pertaining to the network node;

sending a message from the certain node to a control node reporting the certain node's unique transceiver address, hops-to-host count, and load information; and

recording in the control node the information in the message from the certain node,

whereby a former network node that was powered down, relocated, and powered up is reconfigured as a network node.

30. The method of claim 27, wherein the wireless network is a short range RF network.

31. The method of claim 30, wherein the wireless network is a Bluetooth network.

32. A wireless RF network comprising a plurality of network nodes for communicating with other nodes, each node of the wireless RF network having a controller unit, a data store and a unique identifier, wherein:

a) at least one of the plurality of nodes is selected to serve as a control node of the wireless RF network;

b) the at least one selected control node is provided with a unique host ID stored in a host ID register accessible to said selected control node;

c) an inquiry message is periodically sent to other nodes within the coverage area of each respective node of the plurality of nodes;

d) the data store of each respective node of the plurality of nodes is periodically updated with addresses of detected nodes received from responses to the inquiry message by said detected nodes;

e) the unique identifier of each respective node prescribed to pertain to the wireless RF network accessible to the at least one control node of the wireless RF network is stored;

f) a dynamic paging message is transmitted from the at least one control node of the wireless RF network addressed to each respective node located within the coverage area of the at least one control node and having the unique identifier stored accessible to the at least one control node;

g) each respective node receiving the dynamic paging message updates its data store and returns relative information of the updated data store to the at least one control node of the wireless RF network;

h) each respective node stores the received relative information of the updated data store accessible to the at least one control node of the wireless RF network;

i) the at least one control node of the wireless RF network transmits a message to each respective node which returned the relative information of the updated data store, the message instructing said node to send the dynamic paging message addressed to each respective node matching predefined criteria;

j) sending of the dynamic paging message is repeated until every node identified to the at least one control node has been paged.

33. The wireless RF network of claim 32, wherein the predefined criteria are matched if the respective node to be paged is located within the coverage area of the node

instructed to send the dynamic paging message and has a unique identifier stored accessible to the at least one control node, and if the respective node to be paged has not previously been paged.

34. The wireless RF network of claim 32, wherein the dynamic paging message comprises the unique host ID of the at least one control node of the wireless RF network and a dynamic hops-to-host count.

35. The wireless RF network of claim 34, wherein the dynamic hops-to-host count is dependent on the placement of each respective node receiving the dynamic paging message.

36. The wireless RF network of claim 35, wherein the hops-to-host count is 1 when the node receiving the dynamic paging message is within the coverage area of the at least one control node of the wireless RF network, and the hops-to-host count is incremented by 1 each time a previously paged node is instructed to send the dynamic paging message to each respective node matching predefined criteria.

37. The wireless RF network of claim 34, wherein the unique host ID is stored in a non-volatile host ID register of each respective node receiving the paging message.

38. The wireless RF network of claim 32, wherein the wireless network is a short range RF network.

39. The wireless RF network of claim 38, wherein the wireless network is a Bluetooth network.

40. A wireless RF network, the network comprising a plurality of network nodes for communicating with other nodes, each node of the wireless RF network having a controller unit, a data store and a unique identifier, wherein:

a) identification information is maintained including a unique identifier of each respective node of the plurality of nodes prescribed to pertain to the wireless RF network;

b) other nodes within coverage area of each respective node of the plurality of nodes are detected and the data store of the each respective node of the plurality of nodes is updated with information received from the detected nodes;

c) a dynamic paging message is transmitted addressed to each respective node matching predefined criteria;

d) relative information of the dynamic paging message within each respective node receiving the dynamic paging message is stored and a response message to the dynamic paging message is returned;

e) transmitting of the dynamic paging message is repeated until every node identified has been paged.

41. The wireless RF network of claim 40, wherein the predefined criteria are matched if the respective node to be paged is located within the coverage area of the transmitting node and having unique identifier stored accessible to the at least one node of the wireless RF network, and if the respective node to be paged has not previously been paged.

42. The wireless RF network of claim 40, wherein the dynamic paging message comprises the unique host ID of the at least one control node of the wireless RF network and a dynamic hops-to-host count.

43. The wireless RF network of claim 42, wherein the dynamic hops-to-host count is dependent on the placement of each respective node receiving the dynamic paging message.

44. The wireless RF network of claim 43 wherein the hops-to-host count is 1 when the node receiving the dynamic paging message is within the coverage area of the at least one control node of the wireless RF network, and the hops-to-host count is incremented by 1 each time a previously paged node is instructed to send the dynamic paging message to each respective node matching predefined criteria.

45. The wireless RF network of claim 42, wherein the unique host ID is stored in a non-volatile host ID register of each respective node receiving the paging message.

46. The wireless RF network of claim 40, wherein the wireless network is a short range RF network.

47. The wireless RF network of claim 46, wherein the wireless network is a Bluetooth network.

48. A wireless RF network for routing information while maintaining configuration of a wireless RF network, the network comprising a plurality of network nodes for communicating with other nodes, each respective node having a controller unit, a data store and a unique identifier, wherein:

a) current data load information and a hops-to-host count from each respective node of the wireless RF network are periodically sent to other nodes within the coverage area of said respective node of the wireless RF network;

b) the data store of the each respective node of the wireless RF network is periodically updated with the data load information and the hops-to-host count of other nodes within the coverage area of said respective node of the wireless RF network;

c) at least one path having least hops-to-host count for routing messages from a node to at least one control node of the wireless RF network is selected; and

d) if more than one path having least hops-to-host count exists, a path with least load for routing messages from the node to the at least one control node of the wireless RF network is selected from among them.

49. The wireless RF network of claim 48, wherein each node removes from its data store information pertaining to a node that does not report current load for a predetermined time, whereby a node that becomes non-functional is removed from the network configuration.

50. The wireless RF network of claim 48, wherein:

a service discovery message is sent from a transceiver of a certain node that has just been powered on, the message including the transceiver's unique address;

the service discovery message is received in a client interface transceiver of a network node a message is sent from the network node to the identified transceiver of the certain node, the message containing a handle of a network service accessible through the network node;

the certain node is registered in the data store of the network node, the registration including a hops-to-host count one greater than the network node's;

a message is sent from the network node to the certain node containing a number one greater than the network node's hops-to-host count, which number is recorded in



in the control node the information in the message from the certain node is recorded, whereby a former network node that was powered down, relocated, and powered up is reconfigured as a network node.

a plurality of nodes, each of the plurality of nodes comprising:

a data store operatively connected to said controller unit;

a unique identifier;

a means for detecting other nodes within a coverage area of the node;

a means for receiving a dynamic paging message addressed to the node and updating relative configuration information;

a satellite list database operatively connected to said data store for maintaining updated information of all nodes configured to the wireless RF network; and

a means for relaying the dynamic paging message addressed to each respective node prescribed to pertain to the wireless RF network based on matching a predefined criteria,

wherein at least one of the plurality of nodes is selected to serve as a control node, the at least one control node further comprising:

a unique host ID stored in a host ID register accessible to the at least one control node; and

a node identifier storage accessible to the at least one control node including the unique identifiers of each of the plurality of nodes prescribed to pertain to the wireless RF network; and

a means for transmitting the dynamic paging message addressed to each respective node prescribed to pertain to the wireless RF network based on matching a predefined criteria.

52. The network of claim 51, wherein the predefined criteria is matched if the respective node to be paged appears in the neighbor database accessible to the node transmitting the paging message and has the unique identifier of the node stored at the node identifier storage accessible to the at least one control node, and if the respective node to be paged has not previously been paged.

53. The network of claim 51, wherein the dynamic paging message comprises the unique host ID of the at least one control node of the wireless RF network and a dynamic hops-to-host count.

54. The network of claim 53, wherein the dynamic hops-to-host count is dependent on the placement of each respective node receiving the dynamic paging message.

55. The network of claim 54, wherein the hops-to-host count is 1 when the node receiving the dynamic paging message appears on the neighbor database of the at least one control node of the wireless RF network, and the hops-to-host count is incremented by 1 each time a previously paged node is instructed to send the dynamic paging message to each respective node matching predefined criteria.

56. The network of claim 53, wherein the unique host ID is stored in a non-volatile host ID register of each respective node receiving the dynamic paging message and the hops-to-host count is stored at the satellite list database connected to the data store.

57. The network of claim 51, wherein each node configured to the wireless RF network by receiving the dynamic paging message transmits relative information back to the at least control node.

58. The network of claim 57, wherein the relative information comprises relative content of the updated satellite list database and a list of nodes appearing on the nodes neighbor database.

59. The network of claim 51, wherein the wireless RF network is a short range RF network.

60. The network of claim 59, wherein the short range RF network is a Bluetooth network.

61. The network of claim 51, wherein:

if a node comprises at least two transceivers, the first one to answer paging is designated as a slave transceiver of the RF network and least one of the other transceivers is designated as a master transceiver of the RF network, and each transceiver designated as a master does not answer paging.

62. The network of claim 61 wherein detecting of other nodes is performed by the master.

63. The network of claim 51, wherein a node further includes a transceiver for communication with wireless terminals, whereby a wireless terminal in transmission range of a node may communicate with another wireless terminal in transmission range of a node.

64. The network of claim 51, wherein the control node further comprises a gateway to another network, whereby a wireless terminal in transmission range of a node may communicate with a terminal on said other network.

65. The network of claim 51, wherein a node not within a transmission range of a certain node communicates with the certain node by relaying through other of the nodes of the wireless RF network.